NOTES AND EXTRACTS.

APPARATUS FOR REGISTERING THUNDERSTORMS.

Some years ago the late Mr. G. J. Symons constructed a very complete apparatus for registering the time and intensity of thunder. According to Nature for May 15, p. 65 (1902), a new piece of apparatus for thunderstorm registration has been constructed by Fathers Fenyi and Schreiber:

The apparatus consists mainly of three portions; the first consists of a horizontal magnetic needle mounted on a vertical support between a small and sensitive coil of wire, the needle and its stop being connected with a battery, a bell, and a registering apparatus, the needle when in contact with its stop completing the circuit. The registering apparatus is a small electro-magnet which actuates a pen in contact with a disc, and the latter is connected with a clock and moves with regular velocity. The third and very important portion of the arrangement is the coherer, which is composed of two delicately suspended needles nearly in contact; these are connected in a circuit, which includes the coil in which the horizontal needle is placed, a cell, and the long intercepting wire, corresponding to the tall post with wire of the Marconi telegraph system. The apparatus works in the following manner: A distant flash of lightning starts a wave-impulse, and this is led to the coherer by the intercepting wire; the needles move and touch each other, thus completing the circuit, and allow a current to pass through the coil. This coil immediately causes the needle inside it to be deflected to the stop. The second circuit is thus completed, the needle on the registering apparatus marks a deflection on the disc, the bell is rung, and the vibration caused by the latter separates the needles of the coherer. According to the account here given, the instrument is very efficient and has been found to record storms as many as 20 miles away, while on another occasion the instrument during very fine weather was working "apparently rebelliously," but was really recording a great storm raging at Budapest (as shown by the time of occurrence and record at each place), a distance of 110 kilometers from the apparatus.—*C. A.*

LIGHTNING RECORDER.

In the Annual Report for 1901–02 of St. Ignatius College, Cleveland, Ohio, the Reverend F. L. Odenbach publishes an appendix on the work of his meteorological observatory during the past year. This begins with an account of his new lightning recorder, or ceraunograph. He says that on seeing the first working model of the apparatus for wireless telegraphy and its action under the influence of electro-magnetic waves, he came to the conclusion that it was possible to harness lightning and force it to record its own doings. On May 1, 1901, the first warning was received, and two hours later the thundercloud was over the station. The various parts of the instrument were a relay, a telegraph sounder, a coherer, choking coil, two batteries, a recording drum, or chronograph, a copper collector on the roof of the college, and a copper wire leading from it down to the instrument in the observatory. A lightning flash sends out in all directions rays of electro-magnetic waves, which travel like light. The waves from a distant flash strike the copper collector and descend on the wire to the primary circuit of the relay. Their way is blocked by the choking coil, and therefore they pass in great part through the coherer. The moment they do so this tube becomes a conductor for the primary current; the relay goes into action and closes a secondary circuit; the recording magnet moves the pen and makes the record; but at the same time the sounder in this same secondary circuit clicks, shakes the coherer, and all is over until a second distant flash sends another electric wave. This first crude instrument worked successfully during the whole of the summer of 1901, but is now replaced by an improved apparatus. In this new apparatus a graphite coherer is used, consisting of sticks of graphite such as are known as "A. W. Faber's Siberian leads for artists' pencils." The record for 1901 shows that the thunderstorms reach Cleveland from one to three hours after the first record of distant lightning. In a few cases this record is not followed by a thunderstorm, but these are very rare. In general, a Weather Bureau station furnished with this apparatus should be able to give an hour's notice of an approaching local storm. The silent electric discharges attending snowstorms may also enable one to predict the approaching snow.

INDEX FOR WEATHER MAPS.

Father Odenbach has also devised a method of indexing the types of weather maps, by the use of what he calls "symbolic shorthand." He divides the United States weather map into sixteen regions, designated by names and numbers. Each weather map can be described by the position of its areas of high and low pressure, e. g., the expression $\frac{9\text{–}16}{12\text{–}14}$ for January 1, means that on that day there were "highs" in regions 9 and 16 and "lows" in regions 12 and 14. A card bearing the date of the map and the proper descriptive formula is made up for each map for the whole ten years. The cards are then arranged according to the formulæ and all those having the same formula are collected together; after copying the whole series of dates on one card the others are destroyed as no longer needed. With this index the student is able to ascertain whether the combination of highs and lows that he sees on any weather map has ever occurred before, and if so, on what dates.—*C. A.*

RADIO-ACTIVE RAIN.

The newest theories as to the origin of atmospheric electricity and the formation of rain, and in fact as to the very nature of electricity itself, have received interesting confirmation by some recent observations by Mr. C. T. R. Wilson, the assistant of Prof. J. J. Thomson in the Cavendish Laboratory, Cambridge, England. We quote the following from Nature, June 5, 1902, p. 143, as an abstract of the paper read before the Philosophical Society at Cambridge on May 5:

As the experiments of Elster and Geitel and of Rutherford have shown, a negatively charged body exposed in the atmosphere becomes radioactive, apparently showing the presence of some radioactive substance in the atmosphere, it occurred to the author to test whether any of this radioactive substance is carried down in rain. Freshly fallen rain water (less than 50 c. c. was generally used) was found when exposed to dryness to leave behind a radioactive residue. The radioactivity was detected by means of the increase in the ionisation of the air within a small vessel, of which the top, or, in some experiments, the bottom, was of thin aluminum or gold leaf, the other walls being of brass. The metal surface on which the rain had been evaporated was placed close up to the aluminum or gold leaf, and the rate of movement of a small gold leaf which served to measure the ionisation was observed (v. Roy. Soc. Proc., vol. lxviii, p. 151). In many cases the radioactivity obtained from the rain was sufficient to increase the ionization five or six fold. From the evaporation of distilled water, of tap water, or of rain water which had stood for many hours no radioactivity was obtained. Like the induced radioactivity obtained on a negatively charged body, that derived from rain gradually dies away, falling to about half its initial value in the course of an hour.—*C. A.*

LABORATORY WORK IN PHYSICAL GEOGRAPHY AND METEOROLOGY.

There can be no doubt that classes in physiography in our high schools may profit by a laboratory course in elementary meteorology, embracing such observations as can be made by means of the simpler meteorological instruments, and by the eye alone. Such observations, if systematically made and recorded, are valuable *nature studies;* they also lead to a better understanding of the salient features of climate, of the periodic and accidental changes in atmospheric conditions, and of the effect of all these upon health.

The student actually needs and ordinarily uses nothing more than a properly ruled note book in which to record his observations. Such were provided gratuitously for the first class of this kind in 1882 in Washington, D. C. Among the published manuals that will be found helpful to the teacher may be mentioned Practical Exercises in Elementary Meteorology, by R. DeC. Ward, Boston, 1899, and Observations and Exercises on the Weather, by James A. Price, American Book Company, New York, 1902. The first of these is especially adapted to normal schools and colleges. The second, by Mr. Price, is not too difficult for the graded public schools.

Mr. Price first provides by means of suitably ruled pages for the systematic record of personal observations of the weather conditions, the clouds, the winds, and the prominent features of storms. Then follow observations by the aid of such instrumens as the barometer, hygrometer, and thermometers; and finally, by means of the daily weather maps, the observed local conditions are correlated with the general weather conditions in the United States.

The general scheme is to be commended. It is sufficiently flexible to be readily adjusted to the capabilities of any school, and by devoting a few minutes to observations daily a knowledge of the various meteorological elements may easily be acquired. The numerous printed questions under each topic are admirably adapted to stimulate the student to observe.

It is important, however, that the most approved methods of observing and recording be followed and it is to be regretted that Mr. Price has needlessly complicated his cloud nomenclature by adding to and altering the principal cloud forms recognized by the International Cloud Committee. Strato-nimbus should be included under nimbus clouds, and strato-cumulus should not be differentiated from cumulo-stratus.

The graphic method of indicating wind direction and fluctuations by means of arrows may have its advantages, but in general abbreviations and symbols should conform to the international system.

There appears to be some confusion in the use of the term hygrometer. In Part V, questions 20–22, the readings of the hygrometer are compared with the readings of the thermometer, as though the former were simply a wet-bulb thermometer. This is an unauthorized new use of the word hygrometer and reprehensible from every point of view. It is very important that there be no double meaning and doubtful meaning of words used in science. On a following page, "hygrometer curves" are provided for and these will be of little value unless they represent either the absolute or the relative humidity of the air. No method has been given whereby the student can find either the absolute or the relative humidity. Table III is intended to give the dew-point when we know the readings of dry and wet bulb thermometers, or the so-called psychrometer; but unfortunately it revives a very crude method long since obsolete and probably never before commended to American observers. It was included in the Smithsonian Tables of fifty years ago merely as of historical interest.

By the footnote on page 44 the author states that to obviate confusion the cyclone is considered as extending "from the center of one anticyclone through the 'low' to the center of the next anticyclone." This is objectionable. Anticyclones should be considered quite apart from cyclones. The progressive movement of the former does not coincide with the latter. Furthermore, the anticyclone is now considered to be the dominating factor in determining weather conditions, rather than the subordinate factor that the above method of study would indicate.

A misplaced decimal point in Table I makes all elevations 1,000 times too small, an error that is liable to mislead inexperienced observers.

A careful revision of this manual should be made before a second edition is issued.—*H. H. K.*

ON THE ALTITUDE OF THE AURORA.

The altitude of the aurora above the earth's surface is a matter on which the widest diversity of opinion still exists. The Editor has endeavored to show that we have no satisfactory basis for the opinion that the auroral light always emanates from some point very high above the earth but that on the contrary observations are best reconciled by the assumption that the source of the light is quite near the earth, and perhaps never higher than the lowest clouds. In fact, it is quite possible that the beams and arcs are illusions.

Now that within a few years we shall have a maximum of sunspots, and therefore an increased number of auroras, the Editor hopes that many will turn their attention to a simple method of observing that may be very helpful in settling the points at issue. If the aurora is an optical illusion, such as the rainbow or halo, then two observers at neighboring stations, or one observer by moving from place to place, will observe the beams and arches of light at the same altitude above the horizon. But if these are material entities having a definite locus, then, as the observer changes his location, the arches and beams will change theirs, as compared with the stars in their neighborhood. The question at issue may apparently be settled if an observer will first make a sketch of the stars in the neighborhood of some special auroral beam or arch, then move quickly a short distance north, south, east, or west, make a second careful sketch of the same stars and beam, then return to the first station and repeat the sketch. As the auroral beams always appear to be in motion, one must compare the average of the first and third sketches with the second sketch, in order to eliminate the influence of any motion of the beam. If this comparison shows that the change in the observer's position has caused an apparent change in the position of the auroral beam, then we have the necessary data for computing its distance and altitude. If several observers start from the center and proceed in different directions, each making his own set of sketches, the results will of course be still more satisfactory. It is ordinarily thought that the reason why computed auroral altitudes are so discrepant is because distant observers have such difficulty in assuring themselves that they are simultaneously observing the same point of light. This difficulty is avoided in the present suggested method. In fact one observer starting from the intersection of two street car lines can travel quickly in four different directions successively and do all the work himself, so as to leave no doubt that he is observing the same point.—*C. A.*

SEA TEMPERATURE AND SHORE CLIMATE.

A memoir on the seasonal variations of atmospheric temperature in the British Isles by Mr. W. N. Shaw, the new Director of the Meteorological Office in London, has been published by the Royal Society and brings out the fact that a small variation in the temperature of the air over Great Britain is observed to be superimposed on the regular annual variation of temperature. All the successive stages of temperature changes from summer to winter, and vice versa, seem to be delayed by the influence of the ocean.

Commenting on this general result, Nature (May 29, 1902, p. 116,) says that in order to investigate this subject The Meteorological Council has made a new departure:

> In connection with the publication of the Monthly Pilot Chart of the North Atlantic and Mediterranean Oceans, the cooperation of the mercantile marine has been enlisted to promptly supply daily records of sea temperatures during their voyages. A gratifying response resulted in the return of more than 2,500 ocean temperatures for the month of January, 1902, and 2,750 for February. This mass of valuable information has been grouped in spaces of 2° of latitude by 2° of longitude and the means obtained. The results between 30° north and 60° north form the new feature of the pilot charts of the London Meteorological Office. * * * Here we have the commencement of an investigation, which, if continued and improved as may be found necessary, should be fruitful of the most useful results.